

1. **Contrary to the Examiner's position, the claims in the Supplemental Amendment do adopt suggestions made by the Office and also limit the issues for appeal, and entry is therefore appropriate pursuant to 37 CFR 1.111(B) and (F)**

According to 37 CFR 1.111(a)(2) (the provision relied upon by the Examiner), a Supplemental Reply may be entered if the Supplemental Reply is limited to (B) adoption of the examiner suggestions(s) and (F) simplification of the issues for appeal. As the Examiner has already acknowledged, claims 164-201 are duplicates of those suggested by Examiner Yuan himself and therefore clearly fall under provision (B) as adopting the Examiner's suggestions. Thus, it appears to be claims 202-245 that are the Examiner's primary reason for not entering the amendment. Claims 202-245, however, also incorporate amendments that were suggested by the Office and also address concerns raised by Examiner Yuan himself, and in any case clearly simplify the issues for appeal under section (F) of the rule.

For example, as acknowledged by Examiner Yuan in the final Office Action, Examiner Hendrickson previously indicated that claims containing language limiting the "cage" to 60 or 70 carbon atoms would overcome a putative rejection under 35 U.S.C. §112 and would be allowable. *See* final Office Action, page 5. Applicants are agreeable to this suggestion and have incorporated the suggested language into the Supplemental Amendment. *See* newly proposed claims 203, 204, 216, 217, 224, 225, 236, and 237. Because the new claims incorporate a suggestion made directly by the Office, Applicants believe that the amendment meets the requirements of 37 CFR 1.111(a)(2).

Furthermore, the newly proposed claims are limited to compositions comprising fullerenes having a polyhedral, spherical or icosahedral structure. *See* newly proposed claims 202, 209-211, 215, 221, 222 and 239-245. As Applicants explained to Examiner Yuan during

the telephone conference of September 24, 2009, Applicants believe that inclusion of the terms “polyhedral,” “spherical” and “icosahedral” in these claims most clearly responds to the Examiner’s concern that the claims not be so broad as to read on carbon nanotubes (which contain open ended cylindrical structures). This concern is now reflected in the Examiner’s rejection of the previously pending claims under 35 U.S.C. §112, first paragraph, where the Examiner has rejected the pending claims as being broad enough to read on carbon nanotubes. (*see* page 11 of Office Action). Yet, the Examiner refuses to enter Applicants’ proposed claims that would clearly address this concern, instead forcing Applicants to accept the Examiner’s proposed claim language, which Applicants believe is confusing and furthermore, does not adequately address the concern that the Examiner himself raised.

For example, the Examiner has proposed to limit all claims to read on “cage molecules consisting of carbon atoms that are soluble in non-polar solvents.” *See* proposed Examiner’s Amendment. The Examiner’s rationale for this proposed amendment is that limiting the cage molecules to those that are soluble in non-polar solvents will exclude carbon nanotubes. *See* Office Action at pages 6 and 11.¹ However, the Examiner’s proposed amendment does not effectively accomplish the intended exclusion, as solubility in nonpolar solvents is a variable attribute that may be altered by the inclusion of other chemical entities.² Moreover, the Examiner’s proposed claims arguably suffer from §112, second paragraph issues in that it is unclear as to whether it is the cage molecule or the carbon atoms themselves that are soluble in non-polar solvents.

¹ The Examiner clearly ignores the structural limitations in Applicant’s proposed claims in the Supplemental Amendment, again asserting that “fullerenes” read on carbon nanotubes (see page 6 of Office Action).

² For example, Ji et al. report the use of polysiloxane surfactants to render carbon nanotubes soluble in nonpolar solvents. Ji et al., 2009, “Polysiloxane Surfactants for the Dispersion of Carbon Nanotubes in Nonpolar Organic Solvents,” *Langmuir*, 2009, 25 (20), pp 12325–12331.

The Examiner further argues on page 6 of the Office Action that the term “fullerene” was never discussed in any interview prior to September 2009 nor addressed in any of the previous Office Actions of record. Applicants respectfully disagree. It is the Office itself that began using the term “fullerene” in the first non-final Office Action dated June 3, 1996. Furthermore, in the non-final Office Action dated September 12, 2008, the prior Examiner noted that the terms “fullerene,” “a cage carbon allotrope consisting solely of carbon atoms soluble in non-polar organic solvents, which allotrope is neither graphite or diamond,” and “a cage carbon consisting solely of carbon atoms” all mean the same thing.³ Therefore, Applicants do not agree that the term “fullerene” has been newly introduced into prosecution. Moreover, the prior Examiner equated the term fullerene with the phrase Examiner Yuan is now suggesting in the proposed Examiner’s Amendment. The use of the term “fullerene” in Applicants’ proposed claims is therefore not a new development to the prosecution of this case.⁴

Examiner Yuan asserts in the final Office Action that “[b]y not accepting the examiner’s amendments, it appears that applicants consider the limitations ‘cage molecules consisting of carbon atoms that are soluble in non-polar solvents’ and ‘cage molecules consisting of carbon atoms’ to be different in scope and not synonymous.” See paragraph bridging pages 6-7 of final Office Action. Applicants do not understand the Examiner’s point here since none of the newly submitted claims are directed solely to “cage molecules consisting of carbon atoms.” In fact, in every instance in the newly submitted claims Applicants have incorporated structural limitations to distinguish the claimed compounds from carbon nanotubes, which was the main issue that

³ Claims 89-92 (now cancelled), for example, used the term “fullerene.”

⁴ The final Office Action dated June 23, 2010 also asserts that the term “fullerene” was not used in the original disclosure (p. 6). US case law makes it clear that exact literal support in the specification is not required. *See Martin v. Johnson*, 454 F.2d 746, 751, 172 USPQ 391, 395 (CCPA 1972) (stating “the description need not be in *ipsis verbis* [i.e., “in the same words”] to be sufficient”).

Examiner Yuan raised in the telephonic interviews. Applicants simply believe that the language proposed by Applicants is a better solution to the issue raised by Examiner Yuan than the language that the Office has proposed.

Given that newly submitted claims 202-245 in the Supplemental Amendment incorporate the amendments as suggested by Examiner Hendrickson, respond directly to the concerns raised by Examiner Yuan in the multiple conferences with the Applicant, and actually address the newly posed §112 rejection more clearly and directly than the current proposed Examiner's Amendment and therefore certainly limit the issues for appeal, it is entirely appropriate for the Office to enter the Supplemental Amendment pursuant to 37 CFR 1.111(B) and (F).

2. Entry of the Supplemental Amendment is warranted pursuant to 37 CFR §1.112, or alternatively, the Office Action should be made non-final

According to 37 CFR §1.112, after reply by applicant to a non-final action, the application will be reconsidered and again examined. The applicant will be notified if claims are rejected, objections or requirements made, or decisions favorable to patentability are made, in the same manner as after the first examination. Applicant may then reply to such Office action in the same manner provided in §1.111, *with or without amendment*, unless such Office action indicates that it is made final or an appeal has been taken.

As summarized in the final Office Action, Examiner Hendrickson first raised an issue under 35 U.S.C. §112 in a telephonic interview with Applicants on March 12, 2009, prior to Applicants' submission of the Amendment on that same date. As Examiner Yuan acknowledges, Examiner Hendrickson "indicated that he would soon issue a rejection under §112 in a new Office Action on the ground that the term 'cage' other than 60 carbon atoms or 70 carbon atoms

are not enabled by the application as originally filed.” *See* page 5 of final Office Action. Thus, Examiner Hendrickson acknowledged on March 19, 2009 that there was an alleged §112 rejection that he believed should have been raised in the initial non-final Office Action that was never raised.

Examiner Yuan has continued asserting alleged §112 issues in multiple conferences since taking over the case, particularly over the issue as to whether the claims read on carbon nanotubes. Applicants believe that these communications by Examiners Hendrickson and Yuan constitute further examination under 37 CFR §1.112 and further action by the Office prior to any action being made final. Applicants have the right pursuant to 37 CFR §1.112 to respond to such further non-final rejections “with or without amendment.”

In any case, as noted above, the non-final Office Action dated September 12, 2008 did not include any rejection under 35 U.S.C. §112, first paragraph. In fact, the Action dated September 12, 2008 indicated that some claims were allowable.⁵ It appears that the §112 rejection that is now being raised in this final Office Action is a clear departure from the Office Action dated September 12, 2008. Indeed, the claims pending at the time of the non-final Office Action did not contain either the limitation proposed by Examiner Hendrickson or the limitations now proposed by Examiner Yuan and were deemed, in part, allowable. Accordingly, Applicants’ amendment on March 12, 2009 did not necessitate this new ground of rejection, as asserted in the final Office Action. To be complete, the §112 issue should have been first raised in the non-final Office Action dated September 12, 2008, to allow Applicant sufficient opportunity, on the record, to address the rejection. Instead, the Office has attempted on multiple

⁵ For example, claim 120 was indicated as being allowable, and was directed to “Substantially pure fullerenes in solid form.”

occasions to force Applicants to narrow their claims after the non-final Office Action was mailed, to avoid alleged §112 issues that were never properly raised and that Applicant has never had the opportunity to respond to on the record. In light of these facts, Applicants submit that the finality of the Office Action dated June 23, 2010 should be withdrawn.

In summary, even if the Office should deny entry of the Supplemental Amendment under 37 CFR §1.111 as not limiting the issues for appeal or responding to the Examiner's requirements, Applicants believe that they have a right to entry of the amendment pursuant to 37 CFR §1.112 given that the issues under 35 U.S.C. §112 raised by the Examiners after the nonfinal Office Action constitute additional examination prior to final to which Applicants have a right to respond with amendments. Alternatively, the finality of the most recent Office Action dated June 23, 2010, should be withdrawn.

3. Equity warrants entry of the Supplemental Amendment

In addition to the legal provisions provided above, Applicants respectfully submit that entry of the Supplemental Amendment filed September 25, 2009 is warranted on equitable grounds. Applicants believe that while the Examiner has generally cited select portions of the prosecution correctly, he has failed to properly document the inconsistent and confusing behavior on the part of the Office and has minimized the role the Office has played in extending the prosecution of this application. As detailed below, the convoluted approach taken by the Office has essentially robbed Applicants of their right to a full and proper prosecution on the merits, and equity warrants that Applicants' Supplemental Amendment now be entered and considered on the record.

Applicants first note that on December 12, 2006, Examiner Hendrickson issued a non-final Office Action, rejecting claims 89-93 and 95-121 under 35 U.S.C. §§ 102, 103, and/or 112, and specifically noted that the specification did not support the term “macroscopic.” *See* page 3 of non-final Office Action, dated December 14, 2005.

Nearly six months later, on June 8, 2007, Examiners Tsang-Foster and Chaney withdrew Examiner Hendrickson’s non-final Office Action and issued a suspension of prosecution in the application as a result of a district court ruling on the sister case, U.S. Appl. No. 08/236,933. *See* Office Communication, dated June 8, 2007. Applicants were given three months to provide additional support for the patentability of the applications, specifically regarding support for the term “macroscopic.” *Id.* at 3. Applicants responded on September 7, 2007 and provided the executed declarations of Drs. Terrones, Darwish and Kroto. *See* Communication, dated September 4, 2007, received September 7, 2007. Applicants provided over 175 pages of documentation showing that they had, in fact, developed a novel way of producing macroscopic amounts of the compounds of the claimed invention.

Over a year later, on September 12, 2008, the Office finally responded with a non-final Office Action drafted by Examiner Chaney. Examiner Chaney allowed claims 89, 91, 120, and 121 and either rejected or objected to the other claims.⁶ *See* non-final Office Action, dated September 12, 2008. In objecting to claims 90, 93, 95-97, 99-103, 106, 108, 110-112, 114, 115, 118, Examiner Chaney specifically stated:

Applicant uses several terms in the claims that appear to be equivalents at the time of filing of the instant application. At the time of filing, the term “fullerene” was understood to mean the family of hollow caged carbon molecules with an even number of carbon atoms represented by C₆₀, C₇₀, etc. as stated by Harold

⁶ Again, Examiner Chaney indicated claim 120 was allowable, which was directed to “Substantially pure fullerenes in solid form.”

Kroto in his declaration filed on 16 November 1999 in the instant application. At the time of filing, the terms “a cage carbon allotrope consisting solely of carbon atoms soluble in non-polar organic solvents,” “a cage carbon allotrope consisting solely of carbon atoms soluble in non-polar organic solvents, which allotrope of carbon is neither graphite or diamond,” “allotrope of carbon is neither graphite nor diamond,” and “a cage carbon allotrope consisting solely of carbon atoms” can only refer to the carbon allotrope represented by the fullerene family.

(*Id.* at 4) (emphasis added).

On September 23, 2008, in an Examiner interview with Examiners Chaney and Tsang-Foster, Applicants proposed amending the claim language to use the term “cage molecules consisting of carbon atoms soluble in non-polar organic solvents” to address Examiner Chaney’s concerns about duplication of subject matter in the claims. *See* Examiner Interview Summary Record, dated September 23, 2008. Examiner Chaney agreed the case could be allowable if the currently pending claims were canceled and claims were drafted mirroring those indicated as allowable in co-pending U.S. Appl. No. 07/580,246. *Id.*

In response to the Examiner interview, Applicants, in a response filed March 12, 2009, canceled claims 1-121 and added new claims 122-163 which incorporated the claim language “cage molecules consisting of carbon atoms.” *See* Amendment, dated March 12, 2009. While this language is not identical to the language proposed in the September 23, 2008 interview, Applicants note that, based on Examiner Chaney’s own September 12, 2008 statement, it is equivalent language. Examiner Chaney specifically notes that “[a]t the time of filing, the terms “a cage carbon allotrope consisting solely of carbon atoms soluble in non-polar organic solvents,” . . . and “a cage carbon allotrope consisting solely of carbon atoms” can only refer to the carbon allotrope represented by the fullerene family.” (*see* page 4 of non-final Office Action, dated September 12, 2008). As such, Applicants believe that the amendment filed March 3,

2009 met the requirements of 37 CFR 1.111(a)(2)(i)(B), because, while it did not use the exact language discussed in the previous interview, it incorporated the changes proposed through equivalent language.

Subsequently, Examiner Hendrickson was (again) re-assigned the case, and in a telephonic interview on March 19, 2009, noted that the pending claims (claims 122-163) would be considered allowable “if Applicants amend the claims to limit the term ‘cage’ to consist of ’60 carbon atoms’ or ’70 carbon atoms’.”⁷ *See* Applicant Interview Summary, dated September 25, 2009. However, before Applicants could respond to the substance of the interview with Examiner Hendrickson, the case was reassigned again, this time to Examiner Yuan.

Examiner Yuan chose to completely ignore Examiner Hendrickson’s statements regarding allowability of the claims based on incorporation of the limitation of 60 or 70 carbon atoms, instead suggesting the incorporation of “soluble in nonpolar organic solvents” into the pending claims. *See* page 4 of final Office Action. Examiner Yuan stated that he was concerned that without said language, the claims would read on nanotubes and nanowires, which he felt were outside the scope of the present invention. *Id.* at 6. Examiner Yuan offered to draft an amendment with claims containing his preferred claim language and remove what he felt was unsupported language. Applicants agreed to consider the Examiner’s amendment.

Applicants received Examiner Yuan’s proposed claims on September 11, 2009. After reviewing the claims, Applicants spoke to Examiner Yuan on September 23-24, 2009, proposing acceptance of the Examiner’s claims along with a request for consideration of a number of additional claims. Examiner Yuan only grudgingly accepted Applicants’ proposal and after reviewing Applicants proposed amendments, was extremely recalcitrant, insisting that

Applicants either accept his proposed claims or he would issue a final Office Action. *Id.* Examiner Yuan told Applicants he doubted that support existed for Applicants' proposed language, despite the fact that clear support indeed exists for the proposed language in the Detailed Description of the application. *See* table of exemplary support in Supplemental Amendment. Applicants could not accept the Examiner's claims without prior approval and requested time to consider the proposed claims.

In response to the Examiner's amendment, and the fact that the Applicants had in no way been able to respond to the previous action on the part of Examiner Hendrickson, Applicants submitted a supplemental response and claim amendments on September 25, 2009. Applicants' response was submitted to account for the unresolved issues stemming from the March 19, 2009 interview with Examiner Hendrickson, to incorporate Examiner Yuan's proposed claims, and to incorporate the alternative claim language which Applicants believe is fully supported by the specification and also addresses Examiner Yuan's concerns about the invention reading on nanotubes.

In what can only be described as an inequitable act given the history of this application, Examiner Yuan refused to enter the Supplemental Amendment. Applicants note that at the time the Supplemental Amendment was submitted, action in this case had been essentially suspended by the Office, and Applicants had dealt with at least three different Examiners and had received conflicting information from all three examiners as to what the Office felt was necessary for allowability of the claims.⁷ Further, Applicants were given no opportunity to address the issues raised by Examiner Hendrickson, as should have been allowed to do. Applicants have

⁷ As noted above, Applicants are amenable to this language and indeed it has been incorporated into the claims of the Supplemental Amendment (see newly proposed claims 203, 204, 216, 217, 224, 225, 236, and 237).

continually attempted to work in good faith with the Office, and believe that the Examiner's recalcitrance shows a lack of reasonableness in light of the obscure way in which the Office has dealt with this application. Applicants believe that the convoluted and vacillating approach the Office has used in dealing with the subject application is the main reason that the application is still pending and that there is so much confusion and disagreement as to the scope of allowable subject matter. Accordingly, Applicants respectfully request out of equity and fairness that the Office enter Applicants' Supplemental Amendment at this time and permit Applicants an appropriate examination of the proposed claims on the merits.

Summary

In conclusion, Applicants believe that entry of the Supplemental Amendment filed September 25, 2009 is warranted on both legal and equitable grounds. The claims proposed in the amendment both incorporate suggested revisions proposed by Examiner Hendrickson and directly address concerns regarding scope raised by Examiner Yuan. Accordingly, entry of the amendment is warranted under 37 CFR 1.111(a)(2)(B). Moreover, Applicants believe the newly submitted claims more adequately address the §112 issues raised by Examiner Yuan than the claims proposed by the Office and therefore certainly narrow the issues for appeal under 37 CFR §1.111(a)(2)(F).

In any case, entry of the Supplemental Amendment should be made pursuant to 37 CFR §1.112 given that the issues under 35 U.S.C. §112 raised by Examiners Hendrickson and Yuan after the nonfinal Office Action constitute additional examination prior to final to which Applicants had a right to respond with amendments. Alternatively, the finality of the most recent

⁸ Examiner Chaney indicated allowability for claims to "substantially pure fullerenes"; Examiner Hendrickson

Office Action dated June 23, 2010, should be withdrawn, given that the “newly raised” rejection under 35 U.S.C. §112, first paragraph, most certainly was not made in view of Applicants’ amendment filed March 19, 2009, but rather should have been included in the non-final Office Action as noted by Examiner Hendrickson in the interview of the same date.

Finally, equity warrants entry of Applicants’ Supplemental Amendment given the protracted and confusing history of this application, and the vacillating manner in which this application was transferred around to multiple examiners, each agreeing to allow a different scope of claims. It is unreasonable for the Office to now deny Applicants the opportunity to submit additional claims that Applicants believe respond to the issues raised by the various Examiners, for consideration on the merits.

Prompt reconsideration of entry of the Supplemental Amendment, and examination of the newly submitted claims, is respectfully requested. In the absence of favorable action, Applicants will petition to the Technology Group Director by the two month due date of August 23, 2010. If at any time Examiner Yuan believes that an additional telephonic interview will help to expedite examination, he is encouraged to contact the undersigned.

indicated allowability for cage moieties “having 60 or 70 carbons”; Examiner Yuan indicates allowability for “cage molecules that are soluble in non-polar solvents.”

Except for issue fees payable under 37 C.F.R. 1.18, the Commissioner is hereby authorized by this paper to charge any additional fees during the entire pendency of this application including fees due under 37 C.F.R. 1.16 and 1.17 which may be required, including any required extension of time fees, or credit any overpayment to Deposit Account 50-1283.

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